

ICS: H01L 29/20

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H01L 29/72

TI: \*\*\*BIPOLAR\*\*\* TYPE \*\*\*TRANSISTOR\*\*\*

AB: PURPOSE: To obtain excellent high speed features and to obtain a high current amplification factor, by setting the maximum value of majority carriers in a base region at the density of state or less, where majority carriers are present, by built-in voltages between an emitter region and a base region and between the base region and a collector region.

CONSTITUTION: On an n+ GaAs substrate 11, the following regions are sequentially laminated by an MBE method: an n-type GaAs collector region 12; a p+ type GaAs region 13; an n-type Al<sub>x</sub>Ga<sub>1-x</sub>As transition region 14, in which the composition is controlled so that the band gap is gradually changed; an n-type Al<sub>0.3</sub>Ga<sub>0.7</sub>As emitter region 15; and n+ type GaAs \*\*\*cap\*\*\* layer 16, which facilitates ohmic contact with the emitter region. The impurity density of the collector region 12 is  $5 \times 10^{16} \text{ cm}^{-3}$ , and Si is used as n-type \*\*\*dopant\*\*\*. Be is used as \*\*\*dopant\*\*\* in the base region 13. Its impurity density is  $5 \times 10^{19} \text{ cm}^{-3}$  and its thickness is set at  $10 \text{ \AA}$ . Both the transition region 14 and the emitter region 15 have the impurity density of  $3 \times 10^{17} \text{ cm}^{-3}$ . The cap layer 16 is \*\*\*doped\*\*\* to the high concentration of  $5 \times 10^{18} \text{ cm}^{-3}$ .

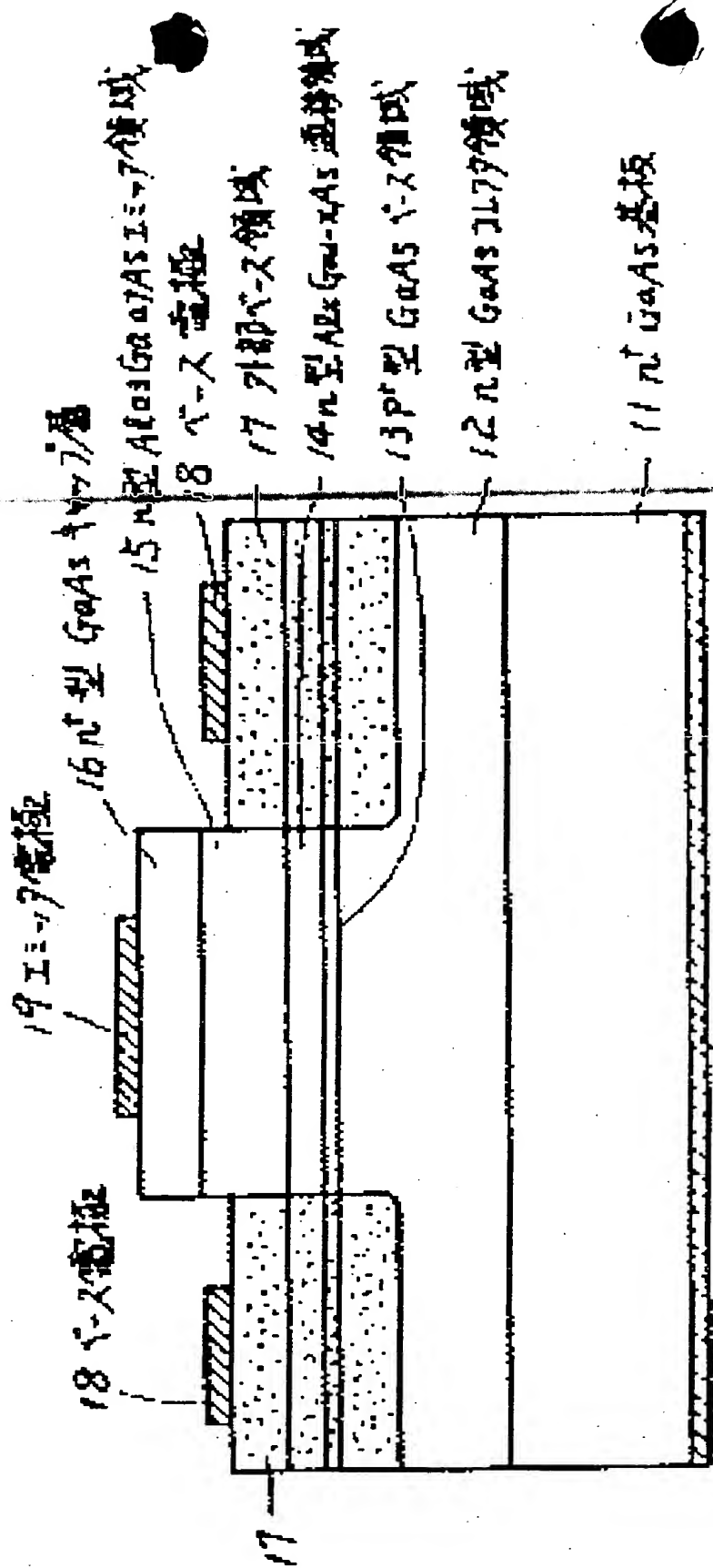
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